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# Use of Hydrostratigraphy to Optimize Remediation Design for Mixed Waste Plume in Complex Geologic Setting

Richard G. Blake, Walt W. McNab, Jr., Lawrence Livermore National Laboratory,
Jonathan D. Hoffman, Michael P. Maley, Weiss Associates

At Lawrence Livermore National Laboratory (LLNL), a ground water plume contains tritium activities slightly above the drinking water standard of 20,000 pCi/L, and VOC concentrations exceeding 10,000 ug/L. In this same area, several additional VOC-only sources form plumes extending up to 2,000 ft downgradient. LLNL's approach is to remove the VOCs from the ground water, but leave the tritium in the subsurface to degrade naturally. This presents the problem of designing a system to remediate VOCs without causing further spreading of the tritium plume.

LLNL is underlain by a complex sequence of unconsolidated alluvial sediments. We use hydrostratigraphic units (HSUs) to define contaminant migration pathways within these heterogeneous sediments. Through a detailed characterization of this area, we determined that the tritium plume was confined to a single HSU. Through a series of pumping tests and other analyses, we determined the degree of hydraulic communication between the HSU containing the tritium plume and the adjacent HSUs. Based on this analysis, we demonstrated that downgradient pumping in adjacent HSUs would not significantly impact the tritium plume. Prior to this analysis, concerns that downgradient pumping would require expensive reinjection galleries or flow barriers to prevent further spreading of the tritium plume caused remediation in this area to be postponed for several years. Based on this new interpretation, remediation of these downgradient plumes began in 1996 without requiring special systems. We are continuing to monitor the tritium plume to verify our analysis.

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